



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/773,516	02/05/2004	Frederick M. Mako	MAKO-12 CONT	6541
7590 Ansel M. Schwartz Suite 304 201 N. Craig Street Pittsburgh, PA 15213		04/09/2010	EXAMINER ORLANDO, MICHAEL N	
			ART UNIT 1791	PAPER NUMBER PAPER
			MAIL DATE 04/09/2010	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/773,516	Applicant(s) MAKO ET AL.
	Examiner MICHAEL N. ORLANDO	Art Unit 1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 09 March 2010.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 9-11 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 9-11 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date _____

4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date _____

5) Notice of Informal Patent Application
 6) Other: _____

DETAILED ACTION

The arguments and amendments submitted 03/09/2010 have been fully considered, but the merits of the claims remain unpatentable over the prior art as set forth below.

Claim Rejections - 35 USC § 112

1. Claims 9-11 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The examiner finds no support for an atmosphere evacuation or a bonding thickness less than 250 microns in the instant specification.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

Art Unit: 1791

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimpo (JP 06-256067) in view of Litton (US 2,972,808) and optionally further in view of either Shinoda et al. (US 4,810,836).

Regarding claim 9, Shimpo discloses a method of joining ceramic products comprising: providing a slurry of polysilazane compound, polycarbosilane compound and ceramic powder of the same type as the products to be joined; applying the slurry to the end faces of two ceramic products to be joined; gluing the end faces together; and heating at a temperature of 1200.degrees.C. to maximize bind strength. Shimpo discloses that the method can be used to form integrated ceramics of complex shapes and large objects through firmly fixed joints and in the Examples sets forth that the type of ceramic productions to be joined can be sticks having a diameter (thus cylindrical

bodies) (translation pages 1-12). Also note that Shimpo discloses adding other additives such as surfactants or thickeners (page 7), which read on the term fillers. Shimpo additionally discloses that the production of the bonding material is done in an inert (i.e. non-reactive) atmosphere (page 8) and appreciates that the joining material should be free from any outside contaminants (pages 3 and 4).

Shimpo fails to explicitly teach the claimed tapering and fails to disclose in the same language as the present claims the evacuation of the environment and the supply of an inert atmosphere. In addition Shimpo does not specifically disclose the bond thickness.

As to the preparation of the slurry in an inert atmosphere, such is an obvious extension of Shimpo because Shimpo discloses both that conversion should be done in an inert atmosphere and that contaminants in general should be avoided in the production process (page 3 and page 8). Though Shimpo does not utilize the same language as the present the claims the inventive concept is the same as the slurry may be mixed in a regular atmosphere, but is subsequently provided with an inert one upon firing. This essentially means that the slurry is moved into an environment which is inert from one that is not. This is same concept as evacuating a non-inert environment and providing (moving to) an inert one. Other than the predicted fact that one would utilize only one compartment rather than multiple there appears to be no real functional difference and as such appears to merely be a design choice. The instant specification contains no disclosure of either the critical nature of this requirement or any unexpected results arising therefrom, and as such this requirement would be arbitrary and therefore

Art Unit: 1791

obvious. Applicant must show that this requirement is critical. *In re Woodruff*, 16 USPQ 2d 1934.

As to the bond thickness it would have been within the level of ordinary skill to balance the desired level of adhesion and cost when choosing a bond thickness.

"[W]here the general conditions of a claim are disclosed in the prior art (adhesive bonding ceramics via preceramic slurries), it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)

Litton, drawn to a method of joining cylindrical ceramic bodies to other cylindrical bodies, discloses that the ends of the cylindrical bodies can be tapered to create a male and female end (figure 1).

It would have been obvious to have tapered the ends of the ceramic bodies of Shimpo in view of Litton because such was known for being better than mere abutting because abutting seals are limited to the cross-sectional area of the cylinders (column 1). Litton also discloses that tapering allows for the control of the thickness of the seal and allows for the creation of a larger sealing region with increased structural strength (column 2). An ordinary skilled artisan therefore would have been motivated to utilize such a feature as male/female tapering in order to create a larger bond region that is not limited by the cross-sectional area of the cylinders and to create an overall stronger bond. The angling of the tapers would have been merely an obvious extension of Shimpo because Shimpo discloses that matching of the angles creates a tight seal (columns 3 and 4) and therefore it is clear that not matching the angles exactly would

create a less tight seal with more of a gap between the bodies. It is therefore obvious to un-match the tapering angles to create more of a gap if more space for adhesive was desired. This fact is also emphasized in Shinoda (figure 12) whereby it is indicated that matching of the geometry of two tapered bodies creates a tight seal that minimizes the thickness of an adhesive applied there between (columns 10 and 11). It was therefore known to taper the ends to create a larger bond area and subsequently stronger bond (facilitated by the larger bonding interface) as well as to modify the fit of the tapered bodies in order to control the tightness of the fit and the resulting gap between the substrates. It is expected that more adhesive bonding material between two substrates yields a stronger bond and also expected that a larger gap allows for more adhesive to fit between the bodies. As to the female angle being larger than male angle such is obvious because there is only a finite number of predictable solutions for un-matching the angles (i.e. male bigger or female bigger) so it would have been obvious to try each.

Regarding claim 10, Shimpo discloses bonding silicon carbide productions by providing the slurry silicon carbide powder of mean particle diameter of 2 microns (page 8), which clearly falls within the claimed range. The courts have established that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

Regarding claim 11, Shimpo discloses that the particle size an average particle size (page 8). The use of the term average indicates that there is more than one particle

size. The use of more than one different particle size (i.e. an average) reads on the limitation of at least two distinct particle sizes.

Response to Arguments

Applicant's arguments filed 03/09/2010 have been fully considered but they are not persuasive.

The applicant argues the joint thickness.

There is no support in the specification for the joint thickness. The fact that Shimpo teaches a joint would read upon a thin thickness as the term thin is a relative term.

The applicant argues the differences of Litton as Litton is drawn to bonding metals to ceramics.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The examiner disagrees with these arguments and notes that Litton is solely relied upon for showing that when bonding two bodies it was known that merely creating abutting joints limits the size of the bonding interface. It would have therefore been obvious to taper the edges to create a longer bonding interface not limited by the cross-sectional area in view of Litton's teachings. This would predictably allow for more adhesive to substrate contact between the substrates even at identical adhesive

thicknesses since the interface region is larger and no longer limited to the cross-sectional area of the cylinder. The applicant seems to be arguing that tapering allows for a bond strength at small thicknesses that would not have been previously achieved by cross-sectionally abutting the ends, but this is predictable in view of Litton as tapering was known to create a larger interface region for more adhesive substrate contact (i.e. stronger bond).

The applicant provides a number of different arguments that merely seek to focus on the differences of Litton and Shimpo.

As stated above the differences of Litton are recognized by the examiner and it is again noted that Shimpo alone teaches the majority of the invention absent the tapering. Litton is merely relied upon to show that by tapering the ends of joining bodies one can create a larger bonding interface. Other arguments towards thermal expansions and metal bonding steps are not part of the rejection above. Litton is merely relied upon to show the tapering feature of bonding two bodies.

It is noted again though that although the arguments and claim limitations were addressed the applicant does not seem to have support in the specification for the new subject matter and the issues therefore appear to be new matter. It is also noted though that in the event the applicant is able to show proof of support and wishes to base the patentable differences upon unexpected results that a showing would need to be provided which provides experimental proof for the unexpected results. The showing would need to be commensurate with the scope of the claims and therefore prove that all preceramic polymers at joint thicknesses between 0 and 250um posses these

results. It is assumed that joint thickness of zero would not meet the unexpected results. In addition the applicant only seems to name a few type of preceramic (carbosilanes, borosiloxanes and silizanes). Further specification of the claims in terms of the preceramic would likely be needed in order to show unexpected results that are commensurate with the scope of protection sought.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL N. ORLANDO whose telephone number is

(571)270-5038. The examiner can normally be reached on Monday-Thursday, 7:30am-4:30pm, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Philip C. Tucker can be reached on (571) 272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MO

/Philip C Tucker/
Supervisory Patent Examiner, Art Unit 1791